

Total No. of Questions : 8]

SEAT No. :

P7663

[Total No. of Pages : 3

[6180]-187

T.E. (Mechanical)

COMPOSITE MATERIALS

(2019 Pattern) (Semester - II) (Elective - II) (302052 - A)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data if necessary.

- Q1)** a) Explain interface and wettability of metal matrix composites. [6]
- b) Explain with neat sketch the stir-casting process of fabrication of a metals matrix composite in details. [6]
- c) What is diffusion bonding? Explain the metal matrix composites produced using diffusion bonding techniques? [6]

OR

- Q2)** a) List three kinds of metal matrix composites and write typical reinforcements used in particle type metal matrix composites. [6]
- b) Explain in detail that metal matrix composites are fabricated using a powder metallurgy process. [6]
- c) Describe with neat sketch the In-situ process of fabrication of a metal matrix composite with its advantages. [6]
- Q3)** a) Find the ultimate shear strength for a glass/epoxy lamina with a 70% fiber volume fraction. Take, Shear modulus of the fiber (G_f) is 35.42 GPa, Shear modulus of matrix (G_m) is 1.308 GPa, Ultimate shear strength of matrix (τ_{12})_{ult} is 34 MPa. [6]
- b) Derive an expression for the volume and weight fraction of composites. [6]
- c) Explain the fatigue property of composite materials. [5]

OR

P.T.O.

- Q4)** a) Find the ultimate transverse tensile strength for a unidirectional glass/epoxy lamina with a 70% fiber volume fraction. Assume that the fibers are circular and arranged in a square array. Take, Young's modulus of fiber (E_f) is 85 GPa, Young's modulus of matrix (E_m) is 3.4 GPa, Ultimate strength of fiber (σ_f) ult is 1550 MPa, ultimate strength of matrix. (σ_m) ult is 72 MPa. [6]
- b) Write a short note on discontinuous fibers and woven reinforcements. [6]
- c) What do you mean by micro-mechanics and macro-mechanics of lamina? [5]
- Q5)** a) Explain recent developments in contact and noncontact strain measurement methods. [6]
- b) Differentiate between double cantilever beam, end notch flexure and interlaminar shear strength test with sketch and formula for each. [6]
- c) Explain any two non-destructive testing for polymer matrix composites. [6]

OR

- Q6)** a) Sketch the schematic representation of V-Notched beam shear test composite and describe the test with regard to ASTM D5379. [6]
- b) What is R-curve in fracture toughness test? Interpret its significance in double cantilever beam specimen with the help of load-displacement diagram. [6]
- c) List the various international and national test standards developed to test mechanical properties of a lamina. [6]

- Q7)** a) State any six properties of Composites that makes it a better material than steel for building application. [6]
- b) Write any three reasons why Composites are preferred in sports equipment? Which composites will be preferred for helmets used in hockey? [6]
- c) What is multi-material technology? State any three benefits of multi-material technology in Automobiles. [5]

OR

- Q8)** a) How does the use of Composite reduce assembly time? which Composite will be preferred for manufacturing of Intake manifolds in an automobile? [6]
- b) Name the composite that can make the automobile lightweight? State any four advantages of the vehicle being light weight? [6]
- c) Why is glass/carbon fiber preferred in blade aerofoil of a Light Combat Aircraft? State the significance of Orientation of fiber in the blade aerofoil of a Light Combat Aircraft? [5]

§ § §